Eastern Foot of Lokon Volcano, North Sulawesi, Indonesia

Muhamad Hendrasto[1]
1. Centre of Volcanology and Geological Hazard Mitigation / Indonesia
e-mail: totok@vsi.esdm.go.id

A small town of Kakaskasen, Tomohon City just located of about 4 - 5 km eastern part of the Lokon active crater. Lokon is one of the most active volcanoes in Indonesia, located at 1.21ºN and 124.47ºE in Tomohon City, Minahasa Regency, North Sulawesi, Indonesia. Lokon complex was formed in Plio-Plistosen orogenic. The beginning activities formed Old Empung. The activities moved to southern part and formed Lokon about 700 year ago. Lava plug was formed on the summit at the end of activities. In 1750 Young Empung was formed. Series of activities continued until the end of 1800. Flank eruption was occurred in 1829 on saddle between Lokon and Empung formed current active crater. The historical interval periods of activities typically have periods 1 - 4 years with dormant intervals of 8 – 64 years. The activity of Lokon Volcano was initiated by ash/gas explosion and followed by magmatic eruptions. Sometimes the activities were accompanied by pyroclastic flows. The recent eruptions were occurred in Februari–April 2001 and February-April 2003. Ash rose 400 - 1500 m above the volcano and fell over a wide region around the volcano on several villages 3-4 km from the crater. In normal condition, the Lokon activity is solfatara/fumarole stage. The maksimum height of the white cloud was about 150 m above crater rim of Tompaluan.Monitoring of Lokon Volcano and volcanic hazard preparedness of the people around the volcano are very important.

21a-P-17

Effective Warning Systems: A Model Developed in Preparation for the 18th March, 2007, Crater Lake Barrier-collapse Lahar, Ruapehu Volcano, New Zealand

Graham S. Leonard[1], Harry Keys[2], Colin Lawrence[2], Douglas Paton[3], Julia Becker[1], David M. Johnston[1]
1. GNS Science / New Zealand
2. Department of Conservation, Turangi / New Zealand
3. School of Psychology, University of Tasmania / Australia
e-mail: g.leonard@gns.cri.nz

Intense public interest has focussed on a potential lahar following the 1995-96 eruptions of Ruapehu. That lahar occurred at about 11:21am, March 18th, 2007. A similar 1953 lahar produced New Zealand's worst volcanic disaster. Both lahars were the result of tephra building up at the outlet of Crater Lake. As the refilling lake reached a critical elevation behind the tephra barrier, it collapsed.

The Eastern Ruapehu Lahar Alarm Warning System was implemented leading up to the 2007 event. It comprises three geophones close to the barrier, and two more each at two sites down the channel, on the upper mountain flank. While the barrier existed, it also contained a tripwire. Automated telemetry activates pagers in an event, initiating an emergency response plan. The system effectiveness hinges on the actions of people receiving the information, and on their combining it with technical data to produce appropriate responses. Therefore, complementary social research focussed on detailed multi-agency planning and response competencies required to effectively respond. Our team recommended the documentation of reliable planning (with ongoing review) of all warning system steps, including decision-making, response roles, message content, message dissemination lists, and intra- and inter-agency communication protocols.

An 'effective warning system' model has evolved from integration of this work with other studies, calling for (1) early warning hardware and public notification, (2) effective system planning, (3) discussion, communication and participation, (4) education and engagement, and (5) regular exercises and blind tests. System effectiveness must be regularly quantitatively evaluated, with the five steps underpinned by regularly updated natural process science, and by technical warning system science. This model was in place for the 2007 lahar, and warning system response was widely considered effective, with no casualties despite a lahar larger than in 1953, and increased local population. This model also provides a template for multi-agency response management planning for other complex volcanic crises.

21a-P-18

Community Emergency Management During the 2005 Ambae Eruption, Vanuatu, SW Pacific

Shane J. Cronin[1], Karoly Nemeth[1], Jonathan N. Procter[1], Douglas T. Charley[2], Morris J. Harrison[2], Esline Garaebiti[2], Brad J. Scott[3], Steve Sherburn[3], Philipson Bani[4], Michel Lardy[4]
1. Institute of Natural Resources, Massey University, Palmerston North / New Zealand
2. Department of Geology, Mines and Water Resources, Port Vila / Vanuatu
3. GNS Science, Wairakei Research Centre, Private Bag 2000, Taupo / New Zealand
4. Institut de Recherche pour le Developpement, BP A5 98848, Noumea, Cedex / Nouvell Caledonie
e-mail: s.j.cronin@massey.ac.nz

Community-based emergency management and self-reliance is an objective pursued globally. It is particularly important in the context of volcanic islands, where external help is not rapidly available. We present a case-study where village-level and island-level community plans developed during 2002-04 through a participatory approach were tested by a recent eruption on Ambae Island, Vanuatu. A series of surtseyan explosions through the summit caldera-hosted crater lake (at c. 1400 m asl.) started at the end of November 2005 and broke a c. 90 year silence from the island volcano. Fears of deadly lahars were driven by oral traditions of past eruption events and led to the spontaneous formation of an island-level disaster committee. Following an official change in volcanic alert level, two days after the onset of activity, an evacuation of people from potential lahar paths was ordered and managed for over four weeks by this committee. Use of almost entirely local resources (transport, food, shelter, and staff) during the highly efficient operation meant that its costs were very low and only minimal external assistance was necessary. Coordination between the island-level committee and individual villages/tribal groups was generally very positive, marred only in cases where existing political disputes existed. In hindsight, lahar hazards from the eruption were low; however, fears of past events, along with the long interval since the last significant events from this volcano sparked the “premature” evacuation. The local management would have been vulnerable had activity escalated, because no planning had been made for hand-over of control to the national level. In addition, the effectiveness of local management was compromised by only partial support from national authorities and overseas aid donors. Interference by an ad-hoc volunteer group of government servants with parochial Ambae interests also at times disrupted due process and sensationalist local and international media coverage also placed further pressure on island-level organisation.

21a-P-19

Monitoring of Volcanic Activity and Advisory Information in Volcano Crises - Case Histories of Usu and Miyake in 2000 -

Hitoshi Yamasato[1]
1. Meteorological Research Institute, Japan Meteorological Agency / Japan
e-mail: yamasato@mri-jma.go.jp

In volcano crisis it is very important to monitor the volcanic activity and to offer the relevant information. I will report the outline of countermeasure taken by Japan Meteorological Agency (JMA) in the crisises at Usu and Miyake volcanoes.

Regarding Usu volcano, in volcanic earthquake swarm JMA issued Volcanic Alert and prompted evacuation directives by the local governments before the first eruption. After then, the Coordinating Committee for Prediction of Volcanic Eruption (CCPVE) evaluated the volcanic activity everyday and the dangerous area was classified into three zones and various operations such as temporal returning home of the people were done. The zoning was determined based on the energy cone model of pyroclastic flow (Yamamoto, 2001). During the operations, volcanologists who boarded a helicopter of the Self Defense Forces continuously watched the volcano, JMA watched the data of seismographs, infrasonic microphones and other instruments, and the wireless communication system was prepared for abnormal circumstances.

Regarding Miyake volcano, one hour after the start of volcanic earthquake swarm, JMA issued Volcanic Alert and prompted evacuation. Fissure eruption did not occur and the evacuation directive was released 3 days after the alert. However, volcanic earthquake swarm started again beneath the summit and JMA issued Volcanic Observation Report, then the village prohibited the entry to the summit area before the first summit eruption. The eruption became very large and low temperature pyroclastic flows occurred. The CCPVE commented the possibility of higher temperature pyroclastic flow and evacuation of all people in Miyakejima Island was decided. After then, the island was classified into three zones for public workers for maintenance of infrastructures and/or volcanological research. As well as the case of Usu, the operations were carried out under the volcano watch of JMA, which set alert thresholds determined from the data during the large eruptions.

21a-P-20

The New Volcanic Alert Level

Takashi Yokota[1]
1. Volc. Div., JMA / Japan
e-mail: yokotat@met.kishou.go.jp

For mitigating volcanic disasters, the Japan Meteorological Agency (JMA) watches active volcanoes on 24/7 basis, and issues text information on present volcanic activity when needed. To make it easy for users to realize the present volcanic activity, JMA had issued the volcanic alert level since November 2003. It had described present volcanic activities with the number of 0-5. The level had been applied to 12 volcanoes. However, it was on the basis of magnitude of eruption and hard to realize "what should we do?" such as (preparation for) evacuation, restriction of approaching volcanoes and so on. For the convenience of users, the JMA modifies the volcanic alert level and starts to apply for each volcano.

The new alert level has the features as follows:

- They are divided on the basis of disaster measures, not on the basis of magnitude of eruption.
- The old level 0 and level 1 are united into the new level 1. They will be the same from the viewpoint of practical action. The new level consists of 5 levels (1-5).
- Each new level is related to keyword which corresponds to actions to be taken. For example, 'the new level 3' means "Caution: No need to prepare for evacuation for the time being, but approaching the volcano is restricted".

Before applying the new alert level to each volcano, it is important to have discussions with local municipalities and establish practical action plans for every alert level. We have a plan to apply this new alert level for about 30 volcanoes. The new level is for people near volcanoes, not for aviation. (For example, Lava flows will influence to people on the ground but not to airplanes.) We will apply another volcanic alert level (known as 'the Aviation Color Code') for the safety of aviation.

21a-P-21

Advanced Evacuation Framework Based on Eruption Scenario and Volcano Information of Hokkaido-Komagatake Volcano

Tomoyuki Kanno[1], Yuji Fushiya[1], Toru Shiga[1], Masami Taniguchi[1], Nobuaki Shigeno[1], Hideki Iino[1], Tamio Oikawa[1], Tsuyoshi Kakishita[1]
1. Sapporo District Meteorological Observatory, JMA / Japan
e-mail: tkanno@met.kishou.go.jp

Hokkaido-Komagatake, located in Hokkaido northern Japan, is prominently active volcano. With 1640 eruption the tidal wave occurred in Funka bay due to debris avalanche and caused a little more than 700 sacrifices. In 1694, 1856 and 1929, plinian eruptions occurred and fell the abundant pumice and the volcanic ash around, accompanied also the pyroclastic flows.

Sapporo VOIC, responsible for volcanic activities watch and the disaster prevention information regarding the volcanoes in Hokkaido, strengthens the observation system for Hokkaido-Komagatake volcano since its activities are high and the case where it erupts influence to be large. In addition, its grace from when precursor observed until large eruption occurred is so brief that inhabitant evacuation must execute rapidly. So, Sapporo VOIC drew up an Eruption Scenario on the basis of past volcanic activities records obtaining the cooperation of the well-informed person, and then the Council of Volcanic

Community Emergency Management During the 2005 Ambae Eruption, Vanuatu, SW Pacific.

Cronin, Shane J.

2007-01-01

http://hdl.handle.net/10179/9651